

SHEKAR REDDY MANDADI

NOAA-Geophysical Fluid Dynamics Laboratory, 201 Forrestal Road, Princeton, NJ 08540
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EDUCATION

Indian Institute of Technology, Mumbai (India)

Doctor of Philosophy, Environmental Science and Engineering April 2001

Indian Institute of Technology, Mumbai (India)

Master of Technology, Environmental Science and Engineering January 1997

Sidhartha Engineering College, Vijayawada (India)

Bachelor of Technology, Civil Engineering July 1995

PROFESSIONAL EXPERIENCE

NOAA-Geophysical Fluid Dynamics Laboratory, Princeton, NJ 2004 to Present

- Modeling of atmospheric transport of pollutants including emissions, transformation, and deposition in the General Circulation Model. Development of aerosol optical properties to integrate into the radiation transfer code.
- Long-term simulations of aerosol transport, source contribution to the aerosol loads, radiative perturbation over different regions of the World.
- Understanding of natural aerosol emissions, and their fate in the fast and future climates. The atmospheric budgets and forcings of carbonaceous aerosols in the present and future climate for different SRES emission scenarios.
- Estimation of regional contributions to global black carbon loads and climate impacts.

Centre National de la Research Scientifique

/Laboratoire d'Optique Atmosphérique, France May 2001–April 2004

Research Engineer, Post-doctoral Research Fellow

- Developed parameterizations for atmospheric aerosols transport in the General Circulation Model. Global aerosol transport in the GCM is validated against surface-, satellite- based measurements for different optical and radiative parameters.
- Developed aerosol emissions inventory for open biomass burning from satellite measured fire counts.
- Global climate impacts of aerosols were assessed for aerosols of different source origins.

Indian Institute of Technology, Mumbai (India) August 1997–April 2001

Research Assistant, Environmental Science and Engineering

- Developed detailed national pollutant emissions inventory for India for fossil fuels and biomass burning sources.
- The contributions of different aerosol species to regional radiative effects are estimated.
- The importance of region specific pollutant fly-ash to radiative impacts over the Indian Ocean region was identified.

Environmental Management Centre, Mumbai (India) February–July 1997

Environmental Engineer

- Developed statistical analysis package for Fertilizer Industry for compliance with regulatory requirements
- Conducted Environmental Impact Assessment studies for major transportation projects.

- The feasibility of private sector participation in the Indian infrastructure projects was assessed.
- Developed web based database for the cleaner production practices for UNEP.

Indian Institute of Technology, Mumbai (India) July 1995–January 1997

Research Assistant, Environmental Science and Engineering

- Conducted laboratory experiments to estimate the spread of oils spills into the aquifer media.

TEACHING EXPERIENCE

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|---|-----------|
| Teaching Assistant | 1997–2001 |
| <ul style="list-style-type: none"> • Environmental Monitoring and Analysis Lab • Conducted classroom sessions with graduate students to facilitate their understanding of course material; graded their assignments. Developed problem sets. • Conducted laboratory activities for water and wastewater analyses. • Mentored junior graduate to conduct research. | |

ENVIRONMENTAL AND CLIMATE MODELS/TOOLS

- Experience in developing and running regional and global scale models to understand air pollution, regional and global climate effects.
- Extensively used the emission inventory models, atmospheric dispersion and EPA (MOBILE, CALINE) models.

AWARDS AND HONORS

- START Young Scientist Award (2002): The award is given by the SysTem for Analysis, Research, and Training (START), in recognition of outstanding research on regional aspects of global climate change.
- Indo-French Centre for the Promotion of Advanced Research (IFCPAR), post-doctoral fellowship for 2001-2002.
- Graduate Scholarship, Government of India, 1997-2001.
- Post-graduate Scholarship, Government of India, 1995-1997.
- Indian Water Works Association best paper award for year 1997.

PROJECTS/PANELS

- Contributing author to CCSP report on “Review of the Global Direct Aerosol Forcing from Models and Measurements”, 2005.
- Participant of the project “Assessment of the influences of emission sources, meteorology and atmospheric chemistry on aerosol loadings over south Asia: Implications for regional climate”, financed by National Science Foundation, USA, 2004-2006.
- Participant of the project “PHOENICS: Particles of Human Origin Extinguishing Natural solar radiation In Climate Systems”, financed by European Commission, 2002-2004.
- Participant of the project “Aerosols and Indian Monsoons” financed by Centre Franco-Indien pour la Promotion de la Recherche Avances, 2001-2004.

PEER REVIEWED PUBLICATIONS

Lead Author:

1. **Reddy, M. S.**, and O. Boucher, Climate impact of black carbon emitted from energy consumption in the World's regions, Geophys. Res. Lett., submitted.
2. **Reddy, M. S.**, O. Boucher, N. Bellouin, M. Schulz, Y. Balkanski, J.-L. Dufresne, and M. Pham, Estimates of global multi-component aerosol optical depth and direct radiative

- perturbation in the Laboratoire de Météorologie Dynamique general circulation model, J. Geophys. Res., 110, D10S16, doi:10.1029/2004JD004757, 2005a.
3. **Reddy, M. S.**, O. Boucher, N. Bellouin, Y. Balkanski, and M. Schulz, Aerosol optical depths and direct radiative perturbations by species and source type, Geophys. Res. Lett., 32, L12803, doi:10.1029/2004GL021743, 2005b.
 4. **Reddy, M. S.**, and O.Boucher, A study of the global cycle of carbonaceous aerosols in the LMDZT general circulation model, J. Geophys. Res., 109(D14), D14202, doi:10.1029/2003JD004048, 2004.
 5. **Reddy, M. S.**, O.Boucher, C. Venkataraman, S.Verma, J.-F. Léon, N.Bellouin, and M.Pham, GCM estimates of aerosol transport and radiative forcing during INDOEX, J. Geophys. Res., 109(D16), D16205, doi:10.1029/2004JD004557, 2004.
 6. **Reddy, M. S.**, and C. Venkataraman, Inventory of aerosol and sulphur dioxide emissions from India: I - Fossil fuel combustion, Atmos. Environ., 36, 677-697, 2002a.
 7. **Reddy, M. S.**, and C. Venkataraman, Inventory of aerosol and sulphur dioxide emissions from India: II - Biomass combustion, Atmos. Environ., 36, 699-712, 2002b.
 8. **Reddy, M. S.**, and C. Venkataraman, Atmospheric optical and radiative effects of anthropogenic aerosols from India, Atmos. Environ., 34, 4511-4524, 2000.
 9. **Reddy, M. S.**, and C. Venkataraman, Direct radiative forcing from anthropogenic carbonaceous aerosols over India, Curr. Sci., 76, 101-107, 1999.
 10. **Reddy, M. S.**, and P.M. Modak, Private sector participation in water supply and sanitation, J. Indian Water Works Assoc., 24, 183-192, 1997.

Co-Author:

1. Verma, S., O. Boucher, **M.S. Reddy**, H.C. Upadhyaya, P.Le. Van, F.S. Binkowski, and O.P. Sharma, Modeling and analysis of sulfate aerosols processes in an interactive chemistry GCM, J. Geophy. Res., in revision.
2. Bellouin, N., O. Boucher, J. Haywood, and **M. S. Reddy**, Global estimate of aerosol direct radiative forcing from satellite measurements, *Nature* (438), 1138-1141, 2005
3. Verma, S., O. Boucher, **M. S. Reddy**, S. K. Deb, H.C. Upadhyaya, P. Levan, F. Binkowski, and O. P. Sharma, Tropospheric distribution of sulphate aerosol mass and number concentration during INDOEX-IFP and its transport over the Indian Ocean: A GCM study, *Atmos. Chem. & Phys.*, in revision, 2005a.
4. Verma, S., O. Boucher, C. Venkataraman, **M. S. Reddy**, D. Muller, P. Chaste, and B. Crouzille, Sea breeze effects in aerosol lofting and vertical distribution during INDOEX, in press, 2005b.
5. Habib, G., C. Venkataraman, I. Chiapello, S. Ramachandran, O. Boucher, and **M. S. Reddy**, Seasonal and interannual variability in absorbing aerosols over India derived from TOMS and sunphotometer: Analysis with regional meteorology and emissions, *Atmos. Env.*, in revision, 2005.
6. Textor, C. , M. Schulz, M., S. Guibert, S. Kinne, Y., Balkanski, S., Bauer, T., Berntsen, T., Berglen, O. Boucher, M., Chin, F., Dentener, T., Diehl, R. Easter, H. Feichter, D. Fillmore, S. Ghan, P., Ginoux, S., Gong, A., Grini, J., Hendricks, L., Horowitz, P., Huang, I., Isaksen, T., Iversen, S., Kloster, D., Koch, A., Kirkevåg, J. E., Kristjansson, M., Krol, A., Lauer, J.F., Lamarque, X., Liu, V., Montanaro, G., Myhre, J.E., Penner, G., Pitari, **M. S. Reddy**, Ø., Seland, , P. Stier, T., Takemura, and X. Tie, Analysis and quantification of the diversities of aerosol life cycles within AeroCom, *Atmospheric Chemistry and Physics Discussions*, Vol. 5, pp 8331-8420, 9-9-2005.
7. Kinne, S., M. Schulz, C. Textor, S. Guibert, S. Kinne, Y., Balkanski, S., Bauer, T., Berntsen, T., Berglen, O. Boucher, M., Chin, F., Dentener, T., Diehl, R. Easter, H. Feichter, D. Fillmore, S. Ghan, P., Ginoux, S., Gong, A., Grini, J., Hendricks, L., Horowitz, P., Huang, I., Isaksen, T., Iversen, S., Kloster, D., Koch, A., Kirkevåg, J. E.,

- Kristjansson, M., Krol, A., Lauer, J.F., Lamarque, X., Liu, V., Montanaro, G., Myhre, J.E., Penner, G., Pitari, **M. S., Reddy**, Ø., Seland, , P. Stier, T., Takemura, and X. Tie, An AeroCom initial assessment optical properties in aerosol component modules of global models, *Atmospheric Chemistry and Physics Discussions*, Vol. 5, pp 8285-8330, 8-9-2005.
8. Yu, H., Y.J., Kaufman, M., Chin, M., G., Feingold, L. A., Remer, T.L., Anderson, Y., Balkanski, N., Bellouin, O., Boucher, S., Christopher, P., DeCola, R., Kahn, D., Koch, N., Loeb, **M. S., Reddy**, M. Schulz, T., Takemura, and M. Zhou, A review of measurement-based assessment of aerosol direct radiative effect and forcing, *Atmospheric Chemistry and Physics Discussions*, Vol. 5, pp 7647-7768, 30-8-2005.
 9. Boucher, O., C. Moulin, S. Belviso O. Aumont, L. Bopp, E. Cosme, R. von Kuhlmann, M. G. Lawrence, M. Pham, **M. S. Reddy**, J. Sciare, and C. Venkataraman, DMS atmospheric concentrations and sulphate aerosol indirect radiative forcing: a sensitivity study to the DMS source representation and oxidation, *Atmos. Chem. & Phys.*, 3, 49-65, 2003.
 10. Franke K., A. Ansmann, D. Müller, D. Althausen, C. Venkataraman, **M. S. Reddy**, F. Wagner, and R. Scheele, Optical properties of the Indo-Asian haze layer over the tropical Indian Ocean, *J. Geophys. Res.*, 108(D2), 4059, doi:10.1029/2002JD002473, 2003
 11. Venkataraman, C., C.K. Reddy, S. Josson, and **M. S. Reddy**, Aerosol chemical and size characteristics at Mumbai, India, during the INDOEX-IPF (1999), *Atmos. Environ.*, 36, 1979-1991, 2002.

REPORTS, ISSUE PAPERS AND NEWSLETTERS

1. Boucher, O., J.-L. Dufresne, and **M. S. Reddy**, Effet radiatif des aerosols dans les ondes longues, LMDZinfo, no.5, pp. 16, 2005 (In French).
2. **Reddy, M. S.**, and O. Boucher, Simulations des distributions d'aérosols carbonés dans LMDZT, LMDZinfo, no. 3, pp. 20-21, 2003 (In French).
3. Chary, V.S., and **M. S. Reddy**, A comprehensive study of Medical Waste Management in UK and India, Issue paper-1, Administrative Staff College of India, Hyderabad (India), 2000.
4. **M. S. Reddy**, Sorption studies of Toluene on to Aquifer Media, Indian Institute of Technology, M.Tech. Thesis, pp. 112, 1997, Bombay.

PEER REVIEWED CONFERENCE PROCEEDINGS

1. **Reddy, M.S.**, P. Ginoux, V. Ramaswamy, C. Venkataraman, and S.Verma, Seasonal aerosol loads over the Indian Ocean and their radiative impacts, *Bulletin of the Indian Aerosol Science and Technology Association*, 17(1), 152-154, 2005.
2. Habib, G., C. Venkataraman, I. Chiapello, S Ramachandran, O. Boucher, and **M.S. Reddy**, Long Term variability in absorbing aerosol loading over India detected by TOMS, *Bulletin of the Indian Aerosol Science and Technology Association*, 16(1), 171-175, 2004.
3. Venkataraman, C., G. Habib, J. -F. Leon, O. Boucher, D .G. Streets, M. Shrivastava, A. K. Chaudhary, **M. S. Reddy**, and B Crouzille, Seasonal distributions in black carbon and carbon monoxide emissions from biomass burning in India, *Bulletin of the Indian Aerosol Science and Technology Association*, 16(1), 176-179, 2004.
4. Verma, S., S. K. Deb, O. Boucher, H C Upadhyaya, O. P. Sharma, **M.S. Reddy**, P. Levan, and F. Binkowski, A GCM study on sulphate aerosols during the winter monsoon season for 1998 and 1999, *Bulletin of the Indian Aerosol Science and Technology Association*, 16(1), 43-45, 2004.

5. **Reddy, M.S.**, O. Boucher, C. Venkataraman, Seasonal aerosol emissions from open biomass burning in India, Bulletin of the Indian Aerosol Science and Technology Association, 14(1), 122-125, 2002
6. **Reddy, M.S.**, O. Boucher, C. Venkataraman, M. Pham, Analysis of regional transport of aerosols over INDOEX region through GCM modelling, Bulletin of the Indian Aerosol Science and Technology Association, 14(1), 78-79, 2002.
7. Varghese, S.K., **M.S. Reddy**, C. Venkataraman, Aerosol size distribution characteristics at Mumbai during the INDOEX-IPF, Bulletin of the Indian Aerosol Science and Technology Association, 13(1), 102-106, 2000.
8. **Reddy, M.S.**, C. Venkataraman, Emissions inventory for aerosol chemical constituents and sulphur dioxide from biomass combustion in India, Bulletin of the Indian Aerosol Science and Technology Association, 13(1), 151-155, 2000.

CONFERENCES AND WORKSHOPS

1. Shankar, U., A. Xiu, D. Streets, C. Venkataraman, **M.S. Reddy**, J. Vukovich, and R. Mathur Model investigations on the role of Indian emissions in climate variability over the INDOEX region, AGU Fall meeting, San Francisco, 13-17 December, 2004.
2. **Reddy, M.S.**, O. Boucher, N. Bellouin, M. Schulz, Y. Balkanski, and M. Pham, Global simulation of aerosol optical depths and radiative forcing in the LMDZT general circulation model, Session AS3.14, Aerosol component modeling in global models: comparisons among models and evaluations with data (including AEROCOM), Geophysical Research Abstracts, European Geophysical Union 1st General Assembly, Nice, 25-30 April, 2004.
3. Boucher, O., **M.S. Reddy**, and N. Bellouin, Global aerosol modelling and observations: Towards IPCC fourth assessment report, 2nd AEROCOM workshop, Joint Research Centre, Ispra, 10-12 March 2004.
4. Verma, S., C. Venkataraman, O. Boucher, **M.S. Reddy**, D. Muller, P. Chaste, and B. Crouzille, Sea breeze effects in aerosol lofting and vertical distribution during INDOEX, Workshop in Tropospheric Chemistry and Aerosols, PRL, Ahmedabad, March 24-25, 2004.
5. Verma, S., O. Boucher, H. C. Upadhyaya, O. P. Sharma, **M.S. Reddy**, P. Levan, and F. Binkowski, The Simulation of sulphate aerosol distribution for the INDOEX period with interactive chemistry, INDOCLIM, International Workshop on Role of Indian Ocean on Climate Variability over India, Indian Institute for Tropical Meteorology, Pune, India, 23-27 February 2004.
6. **Reddy, M.S.**, and O. Boucher, Carbonaceous aerosol transport and radiative forcing estimates in LMD-Z GCM, EGS-AGU-EUG Joint Assembly, Nice, France, 06 - 11 April 2003.
7. **Reddy, M.S.**, O. Boucher, Y. Balkanski and M. Schulz, Global three-dimensional simulation of multi-component aerosol transport and radiative forcing with GCM, EGS-AGU-EUG Joint Assembly, Nice, France, 06 - 11 April 2003.
8. **Reddy, M.S.**, O. Boucher, S. Belviso, O. Aumont, L. Bopp, and P. Monfray, Natural aerosol emissions and fate in the future climate: sea salt and dimethylsulfide, EGS-AGU-EUG Joint Assembly, Nice, France, 06 - 11 April 2003.
9. **Reddy, M.S.**, O. Boucher, and C. Venkataraman, Decadal trends in fossil fuel energy consumption and related air pollutant emissions, EGS-AGU-EUG Joint Assembly, Nice, France, 06 - 11 April 2003.
10. Muller, D., K. Franke, A. Ansmann, D. Althausen, C. Venkataraman, G. Habib, and **M.S. Reddy**, Indian ocean experiment (INDOEX): An international, cooperation on the investigation of air pollution in South Asia and its climate and human impact, Indo-German Forum on Education, Research and Science, Berlin, September 24-25, 2003.

11. Liouesse, C., H. Cachier, T. Bond , J.Penner, G.Carmichael, **M.S. Reddy**, R.Gadi, and C. Michel, Recommendations for Estimating Carbonaceous Aerosol Inventories, American Geophysical Society, 2002 Fall Meeting, San Francisco, California, 6-10 December 2002.
12. **Reddy, M.S.**, O. Boucher, C. Venkataraman, J.-F. Léon, and M. Pham, Aerosol transport and radiative effects during north-east winter Indian monsoon, 21st Annual AAAR Conference, Charlotte, North Carolina, October 7-11, 2002.
13. **Reddy, M.S.**, O. Boucher, C. Venkataraman, M. Pham, Carbonaceous aerosol emission estimates for India for regional/global transport models, International workshop on carbonaceous aerosol emission inventory, Toulouse, France, June 11-12, 2002.
14. **Reddy, M.S.**, O. Boucher, C. Venkataraman, M. Pham, and Multi-component aerosol transport and radiative forcing estimates in LMD-GCM during INDOEX, ASP summer colloquium, Boulder, Colorado, 8-19 July 2002.
15. Schulz, M., O. Boucher, Y. Balkanski, M.S. Reddy, F.-M. Bréon, Use of spaceborne POLDER aerosol index and optical thickness in cloud free regions, 7th IGAC Scientific Conference, Crete, September 18-25, 2002.
16. **Reddy, M.S.**, O. Boucher, J.-F. Léon, C. Venkataraman, and M. Pham, Simulation of aerosol transport and radiative effects in LMD-GCM during INDOEX-IPF 1999, OA20.02 Tropospheric Chemistry and Aerosols: Heterogeneous Chemistry and Modelling, Geophysical Research Abstracts, European Geophysical Society XXVII General Assembly, Nice, April 2002.
17. **Reddy, M.S.**, C. Venkataraman, O. Boucher, and M. Pham, A $25^\circ \times 0.25^\circ$ SO₂ and aerosol emissions inventory for India and implementation in the LMD-GCM during INDOEX-IPF 1999, A Changing Atmosphere, 8th European Symposium on the Physico-Chemical Behaviour of Atmospheric Pollutants, Torino (Italy), September 2001.
18. **Reddy, M.S.**, C. Venkataraman, O. Boucher, and M. Pham, A Sulphur Dioxide and Aerosol Emissions Inventory for India for Implementation in the LMD-GCM, International Workshop on Emissions of Chemical Species and Aerosols into the Atmosphere, Paris, June 19-22, 2001.
19. Boucher, O., **M.S. Reddy**, N. Bellouin, M. Pham, C. Venkataraman, and P. Formenti, Climate Change Research Symposium, Santiago de Chile, December 3-5, 2001.
20. Venkataraman, C., G. Habib, **M.S. Reddy**, and G.R. Cass, Developing an aerosol emissions inventory for India for climate studies, Annual meeting of the American Association for Aerosol Research, October 15-19, Portland, OR, USA, 2001.
21. Boucher, O., B. Nicolas, **M.S. Reddy**, J. Trentmann, and P. Guyon, Direct radiative forcing of aerosols on climate, 8th Scientific Assembly of International Association of Meteorology and Atmospheric Sciences (IAMAS), Innsbruck, Austria, 2001.
22. Habib, G., **M.S. Reddy**, and C. Venkataraman, Developing an inventory of sulphur dioxide and aerosol emissions from biofuel combustion in India for climate studies, International Conference on Biomass-Based Fuels and Cooking Systems, Pune, India, 2000.
23. Venkataraman, C., and **M.S. Reddy**, Emissions inventory and atmospheric radiative effects of aerosol chemical constituents over India, International INDOEX Workshop, University of Utrecht, Utrecht, The Netherlands, 1999.
24. **Reddy, M.S.**, and C. Venkataraman, Contribution of aerosol chemical constituents to direct radiative forcing, National Workshop on INDOEX-IPF Results, ISRO Headquarters, Bangalore, 1999.
25. **Reddy, M.S.**, C. Venkataraman, Contribution of carbonaceous aerosols to radiative forcing over India, National Workshop on the INDOEX-India Program, National Physical Laboratory, New Delhi, 1999.

COMPUTATIONAL SKILLS

- Proficient in programming languages Fortran 77/90, C/C++, UNIX shell, Scientific Parallel Computing (OpenMP and MPI), data analysis tools NCO, GrADS, Ferret, IDL, NCL, CDAT, and word processing LaTeX and Microsoft Office.

PROFESSIONAL MEMBERSHIPS

- American Geophysical Union
- Indian Water Works Association
- Indian Aerosol Science and Technology Association

SERVICES AND ACTIVITIES

- Officer, election monitoring committee of Hostel#1, IIT Bombay, 1998-2000.
- Founder secretary of ADARSH, a non-profit organization in Southern India, 1995-2000.

REFERENCES

Dr. Olivier Boucher Head of Climate, Chemistry, and Ecosystems Team, Hadley Center, Met Office, FitzRoy Road Exeter EX1 3PB, UK Tel: +44 -1392 886910 Fax: +44 -1392 885681 e-mail: olivier.boucher@metoffice.gov.uk	Dr. David Streets Senior Scientist Argonne National Laboratory, DIS/900 9700 South Cass Avenue Argonne, Illinois 60439, USA Tel: +1-630-252-3448 Fax: +1-630-252-5217 email: dstreets@anl.gov
Prof. Chandra Venkataraman Department of Chemical Engineering Indian Institute of Technology, Bombay Powai, Mumbai 400 076, India Tel: +91-22576 7224 Fax: +91-22572 3480 e-mail: chandra@che.iitb.ac.in	Prof. V. Ramaswamy Head, Atmospheric Modeling Group, NOAA/Geophysical Fluid Dynamics Laboratory 201 Forrestal Road, Princeton, NJ 08540 Tel: +1-609-452-6510; Fax: +1-609-987-5063 e-mail: v.ramaswamy@noaa.gov